

**REMARKS/ARGUMENTS****Claim Amendments**

Claims 22 through 25 have been added. The original application comprised three (3) independent claims and 21 total claims. After the present amendment, the application comprises four (4) independent claims and twenty-five (25) total claims. Therefore, excess claim fees are due and enclosed herewith.

**Claim Rejections – 35 U.S.C. §101**

In sections 2 – 5 of the Office Action, the Examiner rejected Claims 1-21 under 35 U.S.C. §101 because the claimed invention is directed toward non-statutory subject matter.

In section 5.3 of the Office Action, the Examiner specifically contends that “the claim language of independent Claims 1, 8, and 15 do not claim a practical application, that the language claiming a method, apparatus, and computer program product for: (in claim 1) producing (emphasis added) a discretized representation of a well-conditioned BIE to provide a well-conditioned, finite-dimensional linear system, and solving the linear system to determine values of the equivalent surface sources.” The Applicants respectfully disagree with the Examiner’s conclusion.

As stated in the MPEP 2106(IV)(B)(2)(b)(ii) “A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result.” As the Examiner pointed out the MPEP uses the example that a claimed process for digitally filtering noise employing the mathematical algorithm is statutory. The Applicants submit that the all three independent claims claim a method, an apparatus, and a computer program product which produces a concrete, tangible and useful result.

Claim 1 claims, in part, “A computer program product ... for modeling an electromagnetic response of a[n] ... three-dimensional object to a[n] ... time-harmonic incident field ...” Claim 8 claims, in part, “An apparatus for modeling the electromagnetic response of a[n] ... three-dimensional object to a[n] ... time-harmonic incident field ...” Claim 15 claims, in part, “A method for modeling an electromagnetic response of a[n] ... three-dimensional object to a[n] ... time-harmonic incident field ...” The Applicants submit that the concrete, tangible and useful result of this computer

program product, apparatus and method is the electromagnetic response. This electromagnetic response is specifically an electromagnetic response that results when a given time-harmonic incident field is applied to a three-dimensional object. The first paragraph on page 13 of the present application explains one use of this electromagnetic response by stating, “Determining of this scattering is of particular importance with regard to designing objects having reduced radar cross-sections as well as in designing antennae or other objects that are configured to maximize electromagnetic interception.” Thus, the Applicants submit that Claims 1, 8 and 15 are all directed toward a concrete, tangible and useful result. Therefore, the Applicants respectfully request that the rejection of all the claims under 35 U.S.C. §101 be withdrawn.

### **Claim Rejections – 35 U.S.C. §102**

#### *Claim 1*

In Sections 6-8 of the Office Action, the Examiner rejected Claims 1-3, 8-10 and 15-17 under 35 U.S.C. §102 as being anticipated by the article, “Scaleable Electromagnetic Scattering Calculations on the SGI Origin 2000\*”, authored by J. Ottusch et al., herein referred to as “the Ottusch article.” Specifically, the Examiner stated that the Ottusch article discloses the “FastScat program for efficiently performing frequency domain electromagnetic scattering calculations using a boundary integral equation formulation on parallel computers. Typical applications include radar cross section (RCS) prediction, the computation of antenna radiation patterns, and high-frequency circuit package modeling. FastScat uses a Combined Field Integral Equation formulation (CFIE) which when combined with a simple preconditioner and a conjugate solver, keeps the iteration count reasonable.”

The Applicants thank the Examiner for his acknowledgement that Claims 4-7, 11-14 and 18-21 contain patentable subject matter.

In order to establish a prima facie case of anticipation, the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each of the claimed elements (as arranged in the claim) (4) either expressly or inherently and (5) as interpreted by one of ordinary skill in the art. All of these factors must be present, or a case of anticipation is not met. Thus, “[a]nticipation requires the disclosure in a

single prior art reference of each element of the claim under consideration.” *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

Claim 1 claims, in part, “a discretized representation of a well-conditioned BIE.”

The Examiner has indicated that the Ottusch article teaches this element, on page 1 of the

5 introduction, by stating that “the FastScat program for efficiently performing frequency domain electromagnetic scattering calculations using a boundary integral equation formulation on parallel computers.” Further, the Examiner stated, the “FastScat uses a Combined Field Integral Equation formulation (CFIE) which when combined with a simple preconditioner and a conjugate solver, keeps the iteration count reasonable.” In

10 light of the statements above, the Applicants are unclear on how the Examiner is interpreting the Ottusch article to teach “a discretized representation of a well-conditioned BIE.” As stated on the beginning of page 3 of the Applicants application, “Unfortunately, the most widely used integral equation formulation for closed, perfect electrical conductors (PEC), namely, the combined field integral (CFIE) equation, is not,

15 in genera, well conditioned.” Further, on page 3, starting at line 17 of the Applicants disclosure it states “The most commonly practiced method [to overcome the conditioning problem] is to multiply the CFIE matrix by a preconditioner matrix at every step in the iterative solver procedure.” Therefore, the preconditioner is needed with the CFIE in order to keep the iteration count reasonable. The Applicants are unclear on how the

20 Examiner is interpreting this language to teach the “discretized representation of a well-conditioned BIE,” as is claimed in Claim 1. The prior art appears to teach a preconditioner and a BIE, not a well-conditioned BIE. Therefore, the Applicants submit that the prior art cited by the Examiner does not teach, disclose or suggest all of the limitations found in Claim 1. Thus, the Applicants submit that Claim 1 is patentable over  
25 the cited prior art.

If the Examiner disagrees with the Applicants regarding the patentability of Claim 1, the Applicants respectfully request that the Examiner clarify to the Applicants how he is interpreting the language of the Ottusch article to read on the elements of Claim 1.

## Claims 2-7

Claims 2-7 are dependent on Claim 1. For the reasons given above, Claim 1 is patentable over the art cited by the Examiner. Thus, Claims 2-7 are also patentable over the cited prior art at least through their dependence upon an allowable base claim.

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## Claims 8, 15 and 22

Claims 8, 15 and 22 all claim, in part, “a well-conditioned BIE.” Therefore, the same arguments presented above regarding Claim 1 can also be applied to Claims 8, 15, and 22. Thus, the Applicants submit that Claims 8, 15, and 22 are also patentable over the cited prior art.

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## Claims 9-14, 16-21 and 23-25

Claims 9-14, 16-21 and 23-25 are dependent upon Claims 8, 15 and 22 respectively. For the reasons given above Claims 8, 15 and 22 are patentable over the cited prior art. Therefore, Claims 9-14, 16-21 and 23-25 are also patentable over the cited prior art at least through their dependence upon an allowable base claim.

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**Concluding Remarks:**

In view of the foregoing, it is respectfully submitted that all now pending claims 1-25 are in allowable condition. Reconsideration is respectfully requested. Accordingly, early allowance and issuance of this application is respectfully requested. Should the  
5 Examiner have any questions regarding this response or need any additional information, please contact the undersigned at (310) 589-8158.

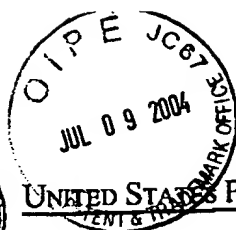
The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 50-2691. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as  
10 including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 50-2691.

15  
Respectfully submitted,

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\_\_\_\_\_  
Date

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,817	06/15/2001	John Jacob Ottusch	HRL053	7997
28848	7590	02/06/2004	EXAMINER	
TOPE-MCKAY & ASSOCIATES 23852 PACIFIC COAST HIGHWAY #311 MALIBU, CA 90265			FREJD. RUSSELL WARREN	
			ART UNIT	PAPER NUMBER
			2128	

DATE MAILED: 02/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Client Ref./Firm Ref. HRL053
<input checked="" type="checkbox"/> Client Copy
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<input type="checkbox"/> Accounting
<input checked="" type="checkbox"/> Docketed
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# Office Action Summary

Application N

09/882,817

Examiner

Russell Frejd

Applicant(s)

OTTUSCH ET AL.

Art Unit

2123

PRG

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11. 6) ☐ Other.

In re Application of: OTTUSCH et al.

***Examination of Application #09/882,817***

1. Claims 1-21 of application 09/882,817, filed on 15-June-2001, are presented for examination.

***Claim Rejections under 35 U.S.C. § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.

3. Claims 1-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The invention claims (claim 1 preamble), *"A computer program product, used in a computer system having a processor, for modeling an electromagnetic response of an arbitrarily shaped three-dimensional object to an arbitrary time-harmonic incident field by means of a well-conditioned boundary integral equation (BIE).*

4. The Manual Patent Examining Procedure (hereinafter MPEP) provides, in Section 2106(IV)(B)(2)(b), that to be statutory, the invention must be analyzed in view of whether or not it can be classified as a series of steps to be performed on a computer, wherein the steps of the process are evaluated to determine if they perform Independent Physical Acts or Manipulate Data Representing Physical Objects or Activities, in order to achieve a
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practical application; and if not, does the invention merely manipulate an abstract idea or solve a purely mathematical problem without any limitation to a practical application.

MPEP Section 2106(IV)(B)(2)(b)(II) further provides that, in regard to Independent Physical Acts (Post-Computer Process Activity), a process is statutory if it requires physical acts to be performed outside the computer independent of and following the steps to be performed by a programmed computer, where those acts involve the manipulation of tangible physical objects and result in the object having a different physical attribute or structure. Furthermore, the Manipulation of Data Representing Physical Objects or Activities (Pre-Computer Process Activity) defines a statutory process as one that requires the measurements of physical objects or activities to be transformed outside of the computer into computer data, where the data comprises signals corresponding to physical objects or activities external to the computer system, and where the process causes a physical transformation of the signals which are intangible representations of the physical objects or activities.

5. In view of the foregoing, and other considerations, the Examiner respectfully contends that the claims of the present invention do not meet the criteria established above for a statutory process. The reasoning behind this determination is:

5.1 The claimed invention, *"A computer program product, used in a computer system having a processor, for modeling an electromagnetic response of an arbitrarily shaped three-dimensional object to an arbitrary time-harmonic incident field by means of a well-*

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*conditioned boundary integral equation (BIE)*", does not require physical acts to be performed outside the computer, those acts being independent of and following the steps to be performed by the computer, those acts further involving the manipulation of tangible physical objects which result in the object having a different physical attribute or structure. For this reason, the claimed invention does not meet the Independent Physical Acts (Post-Computer Process Activity) requirement.

5.2 Further in regard to independent claim 1, the Examiner respectfully contends that the claims fail to require measurements of physical objects to be transformed outside of the computer into computer data; and thereby do not meet the Manipulation of Data Representing Physical Objects or Activities (Pre-Computer Process Activity) requirement.

5.3 MPEP Section 2106(IV)(B)(2)(b)(ii) provides that a statutory computer process is determined not by how the computer performs the process, but by what the computer does to achieve a practical application with a useful, concrete and tangible result. For example, a computer process that simply calculates a mathematical algorithm that models noise is nonstatutory, while a claimed process for digitally filtering noise employing the mathematical algorithm is statutory. The long line of cases in this area that are referred to in MPEP Section 2106(IV)(B)(2)(b)(ii) exemplify this requirement, by utilizing in the claim language, terms such as controlling, executing, changing and removing. In view of the aforementioned requirement, the Examiner respectfully contends that the claim language of independent claims 1, 8 and 15 do not claim a practical application, that language claiming a method, apparatus, and computer program product for: (in claim 1) producing (emphasis

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added) a discretized representation of a well-conditioned BIE to provide a well-conditioned, finite-dimensional linear system, and solving the linear system to determine values of the equivalent surface sources.

5.4 For at least these reasons, the Examiner respectfully posits that the claims of the present invention do not meet the criteria for a statutory process. Accordingly, the *computer program product, used in a computer system having a processor, for modeling an electromagnetic response of an arbitrarily shaped three-dimensional object to an arbitrary time-harmonic incident field by means of a well-conditioned boundary integral equation (BIE)*, is determined to be a method consisting solely of mathematical operations, converting one set of numbers (the well-conditioned BIE) into another set of numbers (the values of the equivalent surface sources), whereby the method does not manipulate appropriate subject matter, and thus cannot constitute a statutory process (MPEP Section 2106(IV)(B)(2)(c)).

### ***Claim Rejections under 35 U.S.C. § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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7. Claims 1-3, 8-10 and 15-17 are rejected under 35 U.S.C. § 102(a) as being anticipated by the article, Scalable Electromagnetic Scattering Calculations on the SGI Origin 2000\*, authored by J. Ottusch et al..

7.1 Ottusch et al. present the FastScat program for efficiently performing frequency domain electromagnetic scattering calculations using a boundary integral equation formulation on parallel computers [page 1, Introduction]. Typical applications include radar cross section (RCS) prediction, the computation of antenna radiation patterns, and high-frequency circuit package modeling. FastScat uses a Combined Field Integral Equation formulation (CFIE) which when combined with a simple preconditioner and a conjugate solver, keeps the iteration count reasonable [p. 2, Th paragraph].

8. Claims 4-7, 11-14 and 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Response Guidelines***

9. A shortened statutory period for response to this action is set to expire **3 (three) months and 0 (zero) days** from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see MPEP 710.02, 710.02(b)).

10. Any response to the Examiner in regard to this non-final action should be directed to: Russell Frejd, telephone number (703) 305-4839, Monday-Friday from 0630 to 1500 ET, or the examiner's supervisor, Kevin Teska, telephone number (703) 305-9704. Any inquiry of a general nature or

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relating to the status of this application should be directed to the  
Group receptionist, telephone number (703) 305-3900.

mailed to: Commissioner of Patents and Trademarks  
Washington, D.C. 20231

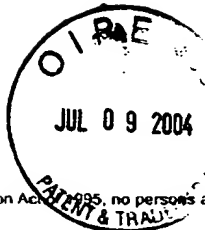
or faxed to: (703) 872-9306

*Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA.,  
Sixth Floor (Receptionist).*

Date: 12-December-2003



RUSSELL FREJD  
PRIMARY EXAMINER



Sheet 1 of 1

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231**

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## OFFICE OF PETITIONS